

WHAT IS CLAIMED IS:

~~1. A charged beam exposure comprising:~~~~a beam generation source generating a charged beam;~~~~a Character Projection(CP) aperture having shaping holes~~

5 of the charged beam having shapes of standard cells used for logic design of a system;

standard cell library recording means for recording first placement positions of the shaping holes on said CP aperture;

10 pattern data recording means for recording second placement positions of the standard cells on a substrate, the second placement positions associated with the first placement positions;

a character select deflector irradiating the charged beam onto the shaping holes at the first placement positions; and

15 an objective deflector irradiating the charged beam onto the second placement positions on the substrate.

2. An exposure as in claim 1, further comprising:

a first shaping aperture rectangularly shaping an irradiation pattern of the charged beam to said CP aperture.

20 3. An exposure as in claim 1, further comprising:

a demagnifying lens demagnifying the irradiation pattern of the electron beam on the substrate.

4. An exposure as in claim 1, wherein

25 said standard cell library recording means further records input and output positions of signals of the standard cells.

5. An exposure as in claim 1, wherein

said CP aperture further has an opening for a variable shaped beam (VSB).

6. An exposure as in claim 1, wherein

30 the shaping holes have a shape of the standard cell having a higher frequency of use or a shape of the standard cell having a higher effect of reducing the number of shots by CP exposure than by VSB exposure.

~~7. An exposure pattern data generation apparatus~~

35 comprising:

Character Proj ction(CP) aperture decision means for

conducting logic synthesis for CP apertures using standard cells corresponding to shaping holes placed on first placement positions on the respective CP apertures, and for selecting the CP aperture used for exposure; and

5 placement and routing means for calculating second placement positions of the standard cells on a substrate, the standard cells corresponding to the shaping holes provided on the selected CP aperture.

8. An apparatus as in claim 7, further comprising:
10 VSB exposure data conversion means for converting data into data capable of being used by an exposure to conduct variable shaped beam (VSB) exposure to the standard cells which cannot be subjected to exposure using the shaping holes.

9. An apparatus as in claim 7, wherein
15 said CP aperture decision means comprises:
standard cell extraction means for extracting the standard cells;

logic synthesis means for conducting synthesized logic using the extracted standard cells; and
20 constraints and the like determination means for determining whether the logic synthesis satisfies a specification.

10. An apparatus as in claim 9, wherein
said CP aperture decision means further comprises:
25 CP aperture creation means for creating a new CP aperture if the CP apertures cannot satisfy the specification.

11. An apparatus as in claim 7, wherein
said placement and routing means calculates wiring routes among the placed standard cells.

12. An apparatus as in claim 7, further comprising:
30 first standard cell library recording means for recording magnitudes, functions and performances of the standard cells, an identification code of the CP aperture on which the shaping holes having the shapes of the standard cells are formed and
35 the first placement positions, and for providing the recorded magnitudes, functions and performances of the standard cells,

the identification code and the first placement positions to said CP aperture decision means.

13. An apparatus as in claim 7, further comprising:

second standard cell library recording means for recording
5 shapes and magnitudes of outlines of the standard cells, positions of input and output signals, an identification code of the CP aperture on which the shaping holes having the shapes of the standard cells are formed and the first placement positions, and for providing the recorded shapes and magnitudes of the
10 outlines of the standard cells, positions of the input and output signals, identification code and the first placement positions to said placement and routing means.

14. An apparatus as in claim 13, further comprising:

pattern data recording means for recording the second
15 placement positions, the identification code and wiring routes among the standard cells provided from said placement and routing means.

~~15. An exposure pattern data generation method comprising:~~

~~conducting logic synthesis for Character Projection (CP)
20 apertures using standard cells corresponding to shaping holes placed at first placement positions on the respective CP apertures;~~

~~selecting a CP aperture used for exposure from the CP apertures; and~~

~~25 calculating second placement positions of the standard cells on a substrate, the standard cells corresponding to the shaping holes provided on the selected CP aperture.~~

16. A method as in claim 15, further comprising:

converting data into data capable of being used by an
30 exposure to conduct variable shaped beam (VSB) exposure to the standard cells which cannot be subjected to exposure using the shaping holes.

17. A method as in claim 15, wherein

said conducting logic synthesis for CP apertures using
35 standard cells corresponding to shaping holes placed at first placement positions on the respective CP apertures comprises:

extracting the standard cells; and
conducting logic synthesis using the extracted standard
cells, and

said selecting a CP aperture used for exposure from the
5 CP apertures comprises:

determining whether the synthesized logic satisfies a
specification.

18. A method as in claim 15, wherein

said conducting logic synthesis for CP apertures using
10 standard cells corresponding to shaping holes placed at first
placement positions on the respective CP apertures further
comprises:

creating a new CP aperture if the CP apertures cannot satisfy
the specification.

15 19. A method as in claim 15, wherein

the calculating second placement positions of the standard
cells on a substrate, the standard cells corresponding to the
shaping holes provided on the selected CP aperture further
comprises:

20 calculating wiring routes among the placed standard cells.

20. A method as in claim 15, further comprising:

recording magnitudes, functions, outline shapes and
outline magnitudes of the standard cells, positions of input
and output signals, identification codes of the CP apertures
25 on which the shaping holes having the shapes of the standard
cells are formed and the first placement positions.

21. A method as in claim 15, further comprising:

recording the second placement positions, identification
codes and wiring routs among the standard cells.

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